CLAIMS

We Claim:

1. A method for validating a probabilistic diagnostic system comprising the following steps:

(a) generating a diagnostic sequence from a diagnostic model;

(b) evaluating the diagnostic sequence to determine whether the diagnostic sequence provides an acceptable resolution to a problem;

(c) repeating steps (a) and (b) for additional diagnostic sequences from the diagnostic model;

(d) determining whether a predetermined number of diagnostic sequences provide an acceptable resolution; and,

(e) accepting the diagnostic model when in step (d) it is determined that the predetermined number of diagnostic sequences provide an acceptable resolution.

2. A method as in claim 1 wherein when in step (d) it is determined that a predetermined number of diagnostic sequences do not provide an acceptable resolution, performing the following additional step:

(f) generating a new diagnostic model.

3. A method as in claim 1 wherein when in step (d) it is determined that a predetermined number of diagnostic sequences do not provide an acceptable resolution, performing the following additional steps:

(f) generating a new diagnostic model; and,

(g) for diagnostic sequences previously evaluated for the diagnostic model, checking to see whether these diagnostic sequences provide acceptable resolutions in the new diagnostic model.

4. A method as in claim 1 wherein when in step (d) it is determined that a predetermined number of diagnostic sequences do not provide an acceptable resolution, performing the following additional steps:

(f) generating a new diagnostic model;

(g) for diagnostic sequences previously evaluated for the diagnostic model, checking to see whether these diagnostic sequences provide acceptable resolutions in the new diagnostic model; and,

(h) when in step (g) it is determined that the diagnostic sequences provide acceptable resolutions in the new diagnostic model, repeating steps (a) through (e) for the new diagnostic model.

5. A method as in claim 1 wherein when in step (d) it is determined that a predetermined number of diagnostic sequences do not provide an acceptable resolution, performing the following additional steps:

(f) generating a new diagnostic model;

(g) for diagnostic sequences previously evaluated for the diagnostic model, checking to see whether these diagnostic sequences provide acceptable resolutions in the new diagnostic model;

(h) when in step (g) it is determined that the diagnostic sequences provide acceptable resolutions in the new diagnostic model, repeating steps (a) through (e) for the new diagnostic model; and,

(i) when in step (g) it is determined that the diagnostic sequences do not all provide acceptable resolutions in the new diagnostic model, repeating steps (a) through (h) for a new revised diagnostic model.

6. A method as in claim 1 wherein the following step is performed before step (a):

constructing the diagnostic model.

7. A method as in claim 1 wherein when in step (d) it is determined that a predetermined number of diagnostic sequences do not provide an acceptable resolution, performing the following additional steps:

(f) generating a new diagnostic model; and,

(g) for diagnostic sequences that provided an acceptable resolution for the diagnostic model, checking to see whether these diagnostic sequences provide acceptable resolutions in the new diagnostic model.

8. A method as in claim 1 wherein when in step (d) it is determined that a predetermined number of diagnostic sequences do not provide an acceptable resolution, performing the following additional steps:

(f) generating a new diagnostic model; and,

(g) for diagnostic sequences that did not provide an acceptable resolution for the diagnostic model, checking to see whether these diagnostic sequences provide acceptable resolutions in the new diagnostic model.

9. A method as in claim 1 wherein step (a) includes the following substeps performed by a first diagnostic engine and a second diagnostic engine:

(a.1) selecting a cause by the second diagnostic engine;

(a.2) suggesting a best next step by the first diagnostic engine, the first diagnostic engine not knowing the cause selected by the second diagnostic engine;

(a.3) selecting an answer to the best next step by the second diagnostic engine, the answer being consistent with the cause selected in substep (b.1); and,

(a.4) repeating substeps (a.1) to (a.3) until the problem is resolved or until the first diagnostic engine is unable to suggest a best next step.

10. A method as in claim 9 wherein in substep (a.1) the cause is selected using a random process.

11. A method as in claim 1 wherein step (a) includes the following substeps performed by a diagnostic engine:

(a.1) selecting a cause by the diagnostic engine;

(a.2) selecting a best next step by the diagnostic engine while temporarily withholding knowledge of the selected cause;

(a.3) selecting an answer to the best next step by the diagnostic engine, the answer being consistent with the cause selected in substep (a.1); and,

(a.4) repeating substeps (a.1) to (a.3) until the problem is resolved or until the diagnostic engine is unable to suggest a best next step.

12. A method as in claim 11 wherein in substep (a.1) the cause is selected using a random process.

13. A method as in claim 1 wherein in step (a) includes traversing sequences and selecting a specified number of sequences according to specific criterion.

14. A method as in claim 13 wherein the specific criterion is longest sequences.

15. A method as in claim 13 wherein the specific criterion is most costly sequences.

16. A method as in claim 13 wherein the specific criterion is failing sequences.

17. A method as in claim 1 wherein in step (a) includes producing a number of sequences, a specified number of which that fulfill a specific criterion being selected for further validation

18. A method as in claim 17 wherein the specific criterion is longest sequences.

19. A method as in claim 17 wherein the sequences produced are random sequences.

20. A method as in claim 17 wherein the specific criterion is most costly sequences.

21. A method as in claim 17 wherein the specific criterion is failing sequences.

22. A method as in claim 1 wherein in step (d) the predetermined number is user selectable.

23. A method as in claim 1 wherein the probabilistic diagnostic system is based on Bayesian networks.

24. A method as in claim 1 further comprising the following steps:

(f) displaying statistics about the diagnostic model resulting from performance of step (a).

25. A method as in claim 1 further comprising the following steps:

(f) displaying statistics about the diagnostic model resulting from performance of step (b).

26. A method as in claim 1 wherein step (a) includes selecting a random diagnostic model, and then selecting a random cause within the random diagnostic model.

27. A method as in claim 1 wherein step (a) includes using a total prior probability of causes in an entire population of diagnostic models to select a random cause.

28. A method as in claim 1 wherein step (a) includes simulating a random sequence to select a random cause.

29. A system for validating a probabilistic diagnostic system, the system comprising:

a case generator that generates diagnostic sequences from a diagnostic model; and,

a case evaluator that allows a user to evaluate the diagnostic sequences generated by the case generator to determine whether each diagnostic sequence provides an acceptable resolution to a problem, the case evaluator determining whether a predetermined number of diagnostic sequences provide an acceptable resolution and accepting the diagnostic model when it is determined that the predetermined number of diagnostic sequences provide an acceptable resolution.

30. A system as in claim 29 wherein the case generator comprises:

a first diagnostic engine; and,

a second diagnostic engine;

wherein when generating a diagnostic sequence the following is repeated until the problem is resolved or until the first diagnostic engine is unable to suggest a best next step:

the second diagnostic engine selects a cause,

the first diagnostic engine suggests a best next step, the first diagnostic engine not knowing the cause selected by the second diagnostic engine, and

the second diagnostic engine selects an answer to the best next step by the second diagnostic engine, the answer being consistent with the cause selected by the first diagnostic engine.

31. A system as in claim 29 wherein the case generator comprises:

a diagnostic engine;

wherein when generating a diagnostic sequence the following is repeated until the problem is resolved or until the diagnostic engine is unable to suggest a best next step:

the diagnostic engine selects a cause,

the diagnostic engine suggests a best next step while temporarily withholding knowledge of the selected cause, and

the diagnostic engine selects an answer to the best next step, the answer being consistent with the cause selected by the diagnostic engine.

32. A system as in claim 29 wherein case generator selects causes using a random process.

33. A system as in claim 29 wherein the case generator traverses sequences and selects a specified number of sequences according to specific criterion.

34. A system as in claim 33 wherein the specific criterion is one of the following:

longest sequences;

most costly sequences; and,

failing sequences.

35. A system as in claim 29 wherein the case generator displays statistics about the generated diagnostic sequences.

36. A system as in claim 29 wherein the case evaluator displays statistics after performing an evaluation.

37. A system as in claim 29 additionally comprising:

a history module that stores a library of diagnostic sequences, information about each diagnostic sequence including the following:

which model versions were tested with the diagnostic sequence;

any results of testing performed with the diagnostic sequence.

38. A system as in claim 36 wherein the history module is used to check whether past accepted and failed cases work in an updated diagnostic model.